

**FIXING HOLDER FOR FIXING ELECTRONIC COMPONENT HAVING WIRE-SHAPED  
LEG PORTIONS TO PRINTED CIRCUIT BOARD , AND FIXING METHOD UTILIZING  
THE SAME**

5                   BACKGROUND OF THE INVENTION

The present invention relates to a fixing holder for fixing an electronic component having wire-shaped leg portions such as an LED (light emitting diode) to a printed circuit board (hereinafter abbreviated as a PCB), and a fixing method utilizing 10 the same.

A PCB is installed in a dipping machine in a state that a multiplicity of electronic components are mounted on the upper portion of the PCB, so that the lower surface thereof soldered.

In general, the dipping machine includes guide rails G having U-shaped configuration in its section for guiding right and left edges of the PCB as shown in Fig. 1A. The PCB is guided by the guide rails G so as to move therealong and passes through a soldering bath provided on a way of the running path, thereby being subjected to the soldering on its lower surface.

20                 Due to the aforesaid configuration of the dipping machine, an electronic component can not be fixed at the left or right edge of the PCB so as to extend across the edge portion transversely.

25                 In other words, such a component which interferes the passing of the guide rails can not be fixed at the edge portion of the PCB where the guide rail G passes.

In a case where electronic components such as an LED are

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required to be fixed at the edge portion of such a PCB by all means due to the requirement for the circuit design, only such components are soldered and fixed manually without using the dipping machine.

That is, components other than such particular components  
5 are soldered and fixed on the PCB by using the dipping machine and only the particular components are soldered and fixed manually.

The Japanese Utility Model Application Publication No. Hei 3-113900 discloses an LED holder. As shown in Fig. 3, such an  
10 LED holder is arranged in a manner that first elastic engagement pieces 101d, 102e for provisional fixing are protrusively provided at the lower end thereof, second elastic engagement pieces 101f, 101g for formal fixing are protrusively provided at the one side thereof, and a thin bending portion 101a is provided between the  
15 first elastic engagement pieces and the second elastic engagement pieces, whereby after the holder is provisionally fixed on a substrate 103, the holder is bent and fixed at a predetermined position of the substrate.

However, when the LED holder 101 is bent at the bending portion 101a, tension force is applied at leg portions 102a, 102b of the LED 102. Thus, there arises a problem that the dipped or soldered portions at the tip ends of the leg portions 102a, 102b may come off or the leg portions 102a, 102b may be broken at portions thereof.

25 Further, according to such a holder, the LED 102 can not protrude to the side direction at the near portion of the edge

of the PCB, and the LED is fixed at the portion lifted from the PCB 103 by the length l of the elastic engagement pieces 101f, 101g. Thus, the holder is insufficient for the degree of freedom in its design.

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#### SUMMARY OF THE INVENTION

Accordingly, an object of the present invention is to provide a holder which can install a PCB in a dipping machine by using the holder even in a case where an electronic component such as an LED must be fixed at the edge of the PCB so that the electronic component can be fixed on the PCB with minimum manual processing.

Further, another object of the present invention is to provide a method for fixing an electronic component having wire-shaped leg portions to a PCB with a fixing holder, the fixing holder being an almost cylindrical-shaped holder for holding the electronic component having the wire-shaped leg portions in a manner that the leg portions pass through and protrude therefrom, the method comprising the steps of: providing a fixing holder on the PCB; holding a main body portion of the electronic component by a holder main body portion of the fixing holder; laying down the holder main body portion towards an opened surface of a base portion thereof; and engaging an engagement nail portion formed on the main body portion of the fixing holder with the PCB.

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#### BRIEF DESCRIPTION OF THE DRAWINGS

Figs. 1A and 1B show an LED holder according to an embodiment

of the present invention, wherein Fig. 1A is an exploded perspective view of the LED holder showing a case where the LED holder is attached to a PCB in an erected state before dipping the PCB, and Fig. 1B is a perspective view showing a state where 5 the LED holder is inclined and laid on the PCB and fixed thereon after dipping the PCB.

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Figs. 2A and 2B show sectional views of the LED holders showing the states of Figs. 1A and 1B, respectively.

Figs. 3A to 3C show a conventional LED holder, wherein Fig. 10 3A is a perspective view showing a state where the holder has not been attached yet, Fig. 3B is a cross sectional view showing a state where the holder is provisionally attached ,and Fig. 3C is a perspective view showing a state where the holder has not been attached.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS  
An LED holder according to the embodiment of the present invention will be explained with reference to the accompanying drawings.

20 Figs. 1A and 1B show the LED holder according to the embodiment of the invention, wherein Fig. 1A is an exploded perspective view of the LED holder showing a case where the LED holder is attached to a PCB in an erected state before dipping the PCB, and Fig. 1B is a perspective view showing a state where 25 the LED holder is inclined and laid on the PCB and fixed thereon after dipping the PCB. Figs. 2A and 2B show sectional views of

the LED holders showing the states of Figs. 1A and 1B, respectively.

As shown in Figs. 1A and 2A, the LED holder of the embodiment is arranged in a manner that the front surface 22 of a base portion 5 2A is formed as a flat surface, the front surface 22 is provided at the end portions thereof on the PCB 3 side with slanted surfaces 23, 23 cut obliquely, and an opening 24 is formed at the front surface 22.

*Sub P3*  
10 The main body portion 2B continuously provided at the base portion 2A is provided at the front surface side of the almost center portion thereof with engagement projection portions 26, 26 having engagement nail portions 25, 25 which are inserted into and engaged with engagement holes 31, 32 provided at predetermined portions of the PCB 3, respectively.

*P4P1*  
15 After an LED 4 is inserted into the LED holder 1 configured in this manner, the entirety of the PCB 3 is installed in the dipping machine in a state that the base portion 2A and the main body portion 2B are erected on the PCB 3 as shown in Fig. 1A. Thereafter, the LED holder is attached to the PCB 3 in the following 20 manner as shown in Figs. 1B and 2B. That is, the main body portion 2B is inclined forward and laid down on the PCB in a manner that the slanted surfaces 23, 23 of the front surface 22 of the base portion 2A are inclined and laid along the upper surface of the PCB 3 thereby to contact the front surface 22 formed by the flat 25 surface to the upper surface. Further, the engagement projection portions 26, 26 are inserted into and engaged with the engagement

holes 31, 32 of the PCB 3 so that the engagement nail portions 25, 25 prevent the engagement projection portions from coming out of the engagement holes, respectively, whereby both the tip portion 27 of the main body portion 2B and the LED 4 protruding 5 from the tip portion 27 protrude from the edge of the PCB 3.

In the drawings, a reference numeral 4a depicts a wire-shaped leg portion of the LED, and 34 a hole formed in the PCB 3 through which the leg portion 4a is inserted.

Thus, in the case of installing the LED holder in the dipping 10 machine, the LED holder 1 can be approached to the guide rails G in such a state that the holder is erected on the PCB 3. Thus, the LED 4 or the holder 1 can be prevented from striking with the guide rails G of the dipping machine. Further, after passing through the dipping machine, an operator can lay down the LED 15 holder 1 sidewise thereby to protrude the LED 4 or the tip portion 27 of the holder 1 from the edge of the PCB 3.

Accordingly, it is possible to eliminate a process of manually soldering the LED 4 and so the number of the processes can be reduced.

Further, since the holder is configured in a manner that the slanted surfaces 23, 23 cut obliquely are formed at the PCB 3 side end portions of the front surface 22 of the base portion 2A so that the holder is inclined and laid down along the slanted surfaces 23, 23 when being inclined and laid down, the holder can 25 be inclined and laid down smoothly.

Further, since the base portion 2A is provided at the front

surface thereof with the opening 24, the leg portions 4a, 4a of the LED 4 can freely move within the opening 24 when the holder is inclined and laid down, so that it is possible to prevent the leg portions 4a, 4a of the LED 4 from being folded or cut.

5 In the drawings, a symbol S depicts a soldered portion soldered by the dipping machine and a reference numeral 40 depicts a rib formed within the main body portion 2B for pivotally supporting the head portion (light emitting portion) of the LED.

10 Regarding the holder, the material of the holder is selected from ABS, or PS, the diameter is 3.5 mm, the height is 20 to 25 mm.

In the above embodiment, the holder holds one LED. However, it is possible to hold twin LEDs.